

2.4 ONE DESIGN DIVISION BOAT CONSTRUCTION MANUAL

DRAFT 1 2010-01-15

Corresponds to Section K alternative



1 GENERAL

1.1 DESIGN

The 2.4 One Design boat was designed by Peter Norlin as The Norlin Mark III.

This Construction Manual shall apply when manufacturing new 2.4 One-Design Boats.

1.2 AUTHORITY

The International 2.4mR Class Association ,ICA, is the authority, which

- assigns the manufacturing rights of the 2.4 OD Boat to OD Licensees
- supervises the production of the licensees
- terminates agreements between a Licensee and the ICA, if needed

1.3 OD LICENSED BUILDER, LICENSEE

The 2.4 One Design hulls and rudders shall only be manufactured by OD Licensed Builders.

Other components of the boat may be manufactured by other manufacturers. These products shall be certified by the Licensee according to his own routines. See below.

If the Licensee is approved for In House Certification, IHC, according to the ISAF Rules, he shall certify his own products.

If the Licensee is not approved for In House Certification, IHC, according to the ISAF Rules, the products will be certified by measurement control. The Licensee shall pay the costs for this control.

The Licensee shall have a documented process with control stations, routines and checkpoints necessary to assure that the products comply with the Class Rules and this Construction Manual. This applies both to Licensees approved and not approved for IHC.

1.4 DOCUMENTS

The following documents shall apply:

- License Agreement between the ICA and the Licensee
- Section K, K1, K2, K3 and K4 of the Int 2.4 mR Class Rules
- This Construction Manual.

2 DRAWINGS

2.1 DIGITAL DRAWINGS

A licensed Builder will get a data file describing the hull shell. From these data a plug can be produced by MNC technique from which the moulds can be manufactured. Moulds may also be manufactured directly from the data. Templates needed to check moulds and built hulls can be manufactured from the data in the same way.

As an alternative, a licensed Builder may buy moulds from Charger Composites.

2.2 OTHER DRAWINGS

The following drawings shall apply when building the 2.4 OD Division boat.

Title	Number
Line drawing	1
Plan and profile layout	2
Templates	3
Structure	4
Rudder	5

Some dimensions, measures and designs are mandatory, while others are application examples. Mandatory measures are underlined and mandatory executions are stated on the drawings. If given application examples are used no approval is needed by the ICA. If the OD Builder wants to use executions, which deviates from the application examples, these will have to be approved by the ICA. This concerns only the lay up of the hull shell and the internal structure and not placing of fittings, seat etc.

3 HULL

3.1 MATERIALS

The **hull** excluding fittings shall be built from Glass Reinforced Plastic. Aluminium or stainless steel reinforcements are permitted where needed. Parts of the hull excluding hull shell and keel may also be made from aluminum or stainless steel.

3.2 CONSTRUCTION

The exterior hull mouldings shall weigh not less than 3.6kg/m^2 .

Where sandwich construction is used, the core material shall be of balsa, PVC or polyester or combinations thereof and shall be of density before lamination not less than 60kg/m^3 in average over a square with the sides 25mm.

The lay up of the hull shell lamination shall be approved by the ICA before the production starts at the Builders yard.

The construction should comply with the drawings given in 2. Alternative constructions may be permitted after approval by the ICA according to the License Agreement.

The hull shall be fabricated in moulds approved by the ICA. Moulds shall be constructed according to plans specified in 2.

The assembling of hull and deck shall be made when the hull is placed in a jig to certify the correct beam at the covering board and using a guiding template to locate the deck in correct position.

3.3 REQUIREMENTS OF THE CONSTRUCTION

The hull and keel shall have such stiffness that when the hull is placed upside down and fastened on a rigid base the keel will not deflect from the centre plane of the boat more than 8mm when the keel is loaded by a horizontal load of 40kg perpendicular to the centre plane at a point in measurement section 2 placed 585mm from the baseline (See 7.1 below or CR K1 drawing 1). The deflection shall be measured when the load is increased from 10kg to 50kg.

The chain plate construction shall have such a rigidity that the mast step displacement in vertical direction will not exceed 2.0mm when it is subjected to a vertical force of 200kg by a jack placed between the mast step fitting and a bar fastened to the shroud fittings in each

end.(The deflection of the bar must be known if the displacement is measured from it). The deflection shall be measured when the load is increased from 50kg to 250kg.

4 DECK

4.1 MATERIALS

The **deck** excluding fittings and breakwater shall be built from Glass Reinforced Plastic. Aluminium or stainless steel reinforcements will be permitted where needed.

4.2 CONSTRUCTION

The exterior deck mouldings shall weigh not less than 3.6kg/m².

Where sandwich construction is used, the core material shall be of balsa, PVC or polyester or combinations thereof and shall be of density not less than 60kg/m³ in average over a square with the sides 25mm before lamination.

The lay up of the deck lamination shall be approved by the ICA according to the License Agreement.

The deck shall be fabricated in moulds approved by the ICA. Moulds shall be constructed according to plans specified in 2.

5 BUOYANCY/BUOYANCY TANKS

5.1 CONSTRUCTION

According to the class rules.

6 SEAT

6.1 MATERIALS

According to the class rules

6.2 CONSTRUCTION

According to class rules

7 ASSEMBLED HULL

7.1 DIMENSIONS

The keel line shall be taken as the intersection line from transom to stem of the hull shell and the **hull** centre plane.

The measurement sections shall be taken as vertical, transverse planes perpendicular to the water line at the following positions:

Section A: 400 mm aft of **hull datum section** as defined in CR, KD.2.2(b)

Section 0: the **hull datum section** as defined in CR, KD.2.2(b)

Section 1: 700mm from **hull datum section** as defined in CR, KD.2.2(b)

Section 2: 1352mm from **hull datum section** as defined in CR, KD.2.2(b)

Section 3: 2100mm from **hull datum section** as defined in CR, KD.2.2(b)

Section 4: 2990mm from **hull datum section** as defined in CR, KD.2.2(b).

The baseline shall be on the centre plane of the **hull** at the following vertical distances:

- at the **hull datum point** as defined in CR, KD.2.2(a): 437mm from the **hull** shell;
- at section 1: 400mm from the **hull** shell.

Dimensions

	Minimum	Maximum
Hull length	4180mm	4182mm
Vertical distance from baseline to keel line		
at section A		
at section 0		
at section 1		
at section 2		
at section 3		
Vertical distance from baseline to under-side of keel		
at section 2	600mm	611mm
at section 1	600mm	611mm
Beam of hull at sheer line		
at section 4	305	307
at section 2	800	804
at section 0	536	540
Horizontal distance from the aft end of the hull to hull datum point	659mm	661mm
Horizontal distance from hull datum section		
to fore end of mast spar hole at deck	2010mm	2043mm
to aft end of shroud holes at deck	1880mm	1900mm
Transverse distance between centres of shroud holes at deck and centre plane	250mm	260mm
Horizontal distance from the intersection of the forestay and the deck to forward end of hull	0mm	10mm

Templates

The leading and trailing edges of the keel shall comply with templates specified in 2.

The hull shall comply with templates at sections A, 0, 1, 2, 3 and 4 specified in 2.

The keel shall comply with keel templates specified in 2.

7.2 FITTINGS

MANDATORY

In accordance with drawing no 2 and CR KD.9.

CONSTRUCTION

Positions of fittings that are mandatory are shown on drawing 2. Other positions are optional. However fittings and their placing for a standard equipped boat is shown on drawing 2 as a guideline.

No fittings may be attached to the outside of the hull (This means that e.g. plastic flaps between hull and rudder are not allowed).

8 BALLAST

According to CR KE.5.

9 RUDDER

9.1 MATERIALS

Rudder blade shall be made of one or a combination of the following materials: Glass Reinforced Plastic and polyurethane foam.

The **rudder** stock shall be of stainless steel.

9.2 CONSTRUCTION

The **rudder** shall be manufactured in a mould approved by the ICA.

9.3 DIMENSIONS

The rudder shall be made according to drawing 5.

Any part of the **rudder**, measured athwart ships shall not exceed 38mm when the **rudder** extends beyond the aft end of the water line.

The rudder shall comply to the relevant templates according to plans given in 2.

The leading and trailing edges of the rudder shall comply with the relevant templates specified in 2.

The rudder stock shall be a pipe of stainless steel with outer diameter of $25\text{mm} \pm 1\text{mm}$ and an inner diameter of not more than 22mm.

9.4 WEIGHTS

	minimum	maximum
Rudder including rudder stock	1.1kg	1.3kg

10 RIG

According to CR KF.